CSCAPE 2005: NOAA Ship *David Starr Jordan*
Weekly Science Report – Leg 6
17 November 2005, Sarah L. Mesnick – Cruise Leader

SCIENCE SUMMARY: 10 November 2005 - 14 November 2005

The DSJ spent the remainder of Leg 6 in the nearshore and offshore waters of central and southern California. This weekly covers our final five days at sea over trackline which traversed tremendous bathymetry (see the oceanography report below) including the Santa Lucia Escarpment where we watched killer whales attack sperm whales a few years ago. However, only half of this time was spent on-effort, the rest was spent in a wind tunnel between a high pressure system to our west and the coast to our east (our thanks to Eric Archer for helping interpret the weather). On Sunday afternoon we woke near Pt. Piedras Blancas, surrounded by breaching humpbacks, but watched as the winds quickly ratcheted up … 25, 30, 35, and 40 knots, culminating in a large wave which bent the solid aluminum MSDS door back 45 degrees, knocked out a window in the winch control booth, and flooded the aft lab.

Animal density in the offshore waters remains low, comprised predominantly of common dolphins and blue whales, but when we hit the edge of the continental slope on Thursday there was an immediate jump in sighting rate and we recorded northern right whale dolphins again, as if planted by a guidebook. Nearer to shore, we recorded several sightings of humpbacks. Approaching the Channel Islands, Cornelia sighted a newly placed tsunami buoy – it's definitely worth taking a close look at (see oceanography report below). Later that day, we launched the small boat on a vocalizing blue whale but came back with a biopsy from a fin whale. The most impressive sighting of the week occurred on one of our off-effort days when we came across a minke whale vaulting out of the 15' swell and then turbo surfing alongside the ship.

This week, we wrapped up a ship-wide game of MURDER, in which Gary stealthily "killed" 8 people before being caught. The engineering department, Howard Boswell, Sam Velez, Glen Bae, Jeffrey Leni and Drew Barth, patched a hole in the starboard engine's heat exchanger overnight and, at this writing, all is running smoothly. We are still trying to work out the flickering monitor situation on the flying bridge and the non-constant constant room temperature. Our thanks to the Chief ET and Chief Engineer who have offered to try again during the import.

It's a joy to sail on the DSJ. The dedication of the scientists to the project is more than impressive; cooperation between crew and scientists is a daily pleasure. Thanks to CO, Alex Von Saunder, for tackling the weather forecasts each night and to the command that safely navigated the high seas each day. Wishing everyone a wonderful and restful import in San Francisco and hoping that you have calm seas and lots of sperm whales on Leg 7.

Sightings and Effort Summary for Marine Mammals

111005	0644	N32:10.08 W120:40.38	46.8 nmi	3.9
	1654	N32:56.08 W120:26.98		
111105	0647	N32:29.36 W122:15.86	71.1 nmi	4.4
	1646	N33:49.56 W121:52.99		
111205			0.0 nmi	6.0+
111305	0910	N35:18.16 W121:17.88	29.2 nmi	5.4
	1245	N35:25.63 W121:52.48		
111405			0.0 nmi	6.0++
111505		in port, San Francisco		
111605		in port, San Francisco		

CODE	SPECIES	TOT#
013	Stenella coeruleoalba	1
017	Delphinus delphis	6
027	Lissodelphis borealis	1
037	Orcinus orca	1
049	Ziphiid whale	1
070	Balaenoptera sp.	3
071	Balaenoptera acutorostrata	1
074	Balaenoptera physalus	1
075	Balaenoptera musculus	4
076	Megaptera novaeangliae	3
077	unid. dolphin	1
079	unid. large whale	2
096	unid. cetacean	1
	TOTAL	26

Biopsies (Gary Friedrichsen and Laura Morse)

Species	10 - 17 Nov	CSCAPE cumulative
Minke whale		1
Humpback whale		21
Blue whale		8
Fin whale	1	2
Sperm whale		11
Baird's beaked whale		2
Short-beaked common dolphin	9	136
Pacific white-sided dolphin		25
Northern right whale dolphin		10

Species	10 - 17 Nov	CSCAPE cumulative
Striped dolphin		2
Dall's porpoise		16
Killer whale		5
Risso's dolphin		4
All Species	10	243

"Frozen Zoo" Project/Cell-culture Report (Laura Morse and Nicole Hedrick)

Species	10 Nov – 16 Nov	CSCAPE cumulative
Blue whale		1
Baird's beaked whale		1
Pacific white-sided dolphin		1
Striped dolphin		1
Dall's porpoise		1
Fin whale	1	1
All Species	1	6

Photo-Project (Cornelia Oedekoven, Holly Fearnbach, and Kathy Hough)

The fruits of our effort this week are very sparse – probably due to the fact that our effort (meaning our time actually spent on effort) was sparse as well. The first day of the week was the best: three blue whale and two fin whale IDs. We even launched the boat – yippee! Other than that, one school of short-beaked common dolphins was kind enough to spend time around the ship. We found two cow/calf pairs of striped dolphins in the same school that approached the ship, but did not stay to ride the bow or to be photographed. Unfortunately, that is all to report about the marine mammals. Meanwhile, we have been working on our photo-id catalog of Laysan Albatross that was mentioned in the previous weekly, matching the photos of individual birds against each other☺. Since this is so much fun, we included a little quiz for the reader where he/she can test their matching abilities themselves:

The Laysan Albatross photo-id quiz: which birds are the same? (photos: various artists)

Species	# Schools Photographed	# Individuals Photographed
Blue whale		3
Fin whale		2
Short-beaked common dolphin	1	

Seabird report (Rich Pagen and Thomas Staudt)

It was a short week heading north towards San Francisco, the screaming wind often our only companion on the flying bridge (what a great word - "screaming"). We encountered 26 species this week, numbers greatly padded by the time we spent within 70 miles of the coast. Some firsts this week included the first Red-billed Tropicbird, Ashy Storm-Petrel, and Least Storm-Petrel of the leg, and the first Black-legged Kittiwakes of the entire cruise. This week we also encountered small groups of Bonaparte's Gulls as far as 50 nm from shore, as well as some of our usual suspects: Leach's Storm-Petrels, Sooty, Pink-footed and Buller's Shearwaters, and Cassin's Auklets. For about half of the day on the 12th, Cassin's Auklet were pouring past the ship (an estimated 700 birds total), all traveling in the same direction (60 degrees true). Perhaps it was the relatively wind-free troughs of the 10 to 12 ft swell that they were attracted too, or perhaps they were just late for a very important date, or in port!

Oceanographic Operations (Candice Hall & Liz Zele)

We've reached the end of leg 6, and long it has been. The weather has plagued us day in and day out, hampering the operations of one and all. In addition, we've had some engine problems that our diligent engineers managed to fix in a jiffy, costing us only one CTD station.

Today the bad weather has prohibited the observers from remaining on the Flying Bridge, which is a pity as we travel through the Monterey Bay National Marine Sanctuary on our way to San Francisco (Figure 1). This Sanctuary was established in 1992 and stretches over 13,780 km^2 of ocean (NCCOS, 2003). The diverse environments found within the Sanctuary ensure that, as of 2003, there were suitable habitats for 33 marine mammals, 94 species of seabirds and approximately 345 fish species (NCCOS, 2003).

This area is oceanographically exciting due to its broad continental shelf (important for species recruitment), frequent coastal upwelling events (as part of an Eastern Boundary Current Ecosystem), Monterey Submarine Canyon and the San Francisco Bay Plume. Figure 1 highlights the estimated summer tidal extent of the Plume (as indicated by the black arrow), from its origin at the Golden Gate. The nutrient and current input (eddies, etc.) of the plume from the San Francisco estuary play an important role within the productivity of the area, subsequently echoing up the marine food chain.

Annual oceanographic perturbations within the region can be split into three periods. March to August is generally characterized by coastal upwelling events; August to November normally brings about a relaxation of the winds; November to March is distinguishable by the presence of winter storms (NCCOS, 2003). However, this year we have been plagued by a series of storms from as early as September.

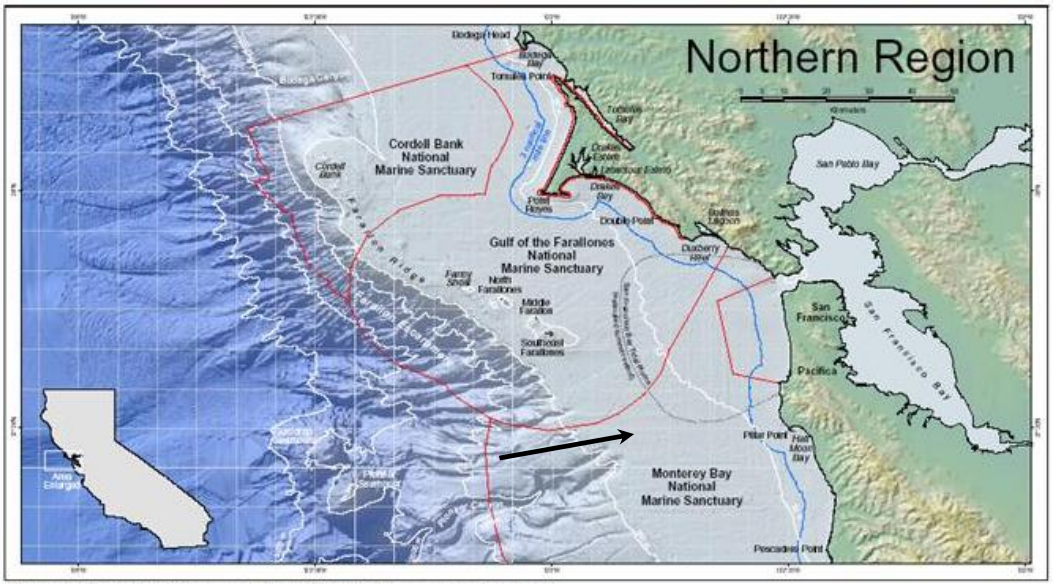

Figure 1: Detailed map from Bodega Head to Pescadero Point. National Marine Sanctuary boundaries shown in red (NCCOS, 2003).

Exciting longer term events that affect this area are the El Niño, Pacific Decadal Oscillation, and global warming (NCCOS, 2003). El Niño events minimize the upwelling of nutrient-rich waters from the deep, decreasing the blooming of plankton and therefore reducing the recruitment of many species within the food web. The Pacific Decadal Oscillation is considered to be a 20 – 30 year cyclic shift in the mean temperature of the Ocean, detected as recently as 1998 (NCCOS, 2003). This, together with the general increase in coastal Pacific waters over the last 40 years, possibly due to 'interdecadal climate shift or global warming' (NCCOS, 2003), may have a large impact on the Pacific environment. Many stenohaline and stenothermic species may be forced to adjust their locations due to changing habitats.

Monterey, Ascension, Pioneer, and Bodega Canyons are defunct deep-sea riverbeds that cut through the continental shelf, leftovers from glacial days. The gradients of their steep walls, sloping bottoms and deep depths provide very different habitats for finicky species. In addition, the near-shore location of these deep canyons has a profound effect on the properties of inshore waters, especially during upwelling events, as deep nutrient-rich water is sucked up from these extreme depths relatively easily. In contrast, Gumdrop, Pioneer, Guide, and Davidson Seamounts may be found on the abyssal plain. Their ability to sustain a diverse offshore ecosystem offers a unique chance to catch exotic samples in our Bongo tows. Figure 2 shows a juvenile nautilus specimen that was returned in one such tow.

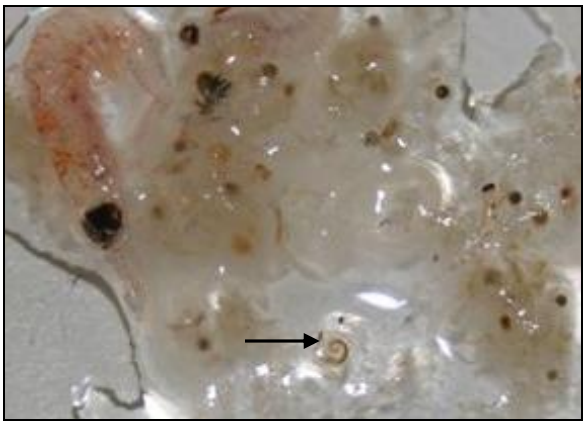

Figure 2: Juvenile nautilus (Photo: Candice Hall)

As every Californian knows the coastline is situated near a tectonic subduction zone, hence the diversity of the continental shelf, seamounts, and canyons. Since the Indian Ocean Tsunami in December 2004, many have become more aware of the destructive ability of a tsunami. This we noticed quite clearly the other day when we stumbled upon a Tsunami warning Buoy (Figure 3), complete with life-guard(s?). It seems that his dedication dictated that he stay at his post, regardless of the absence of swimmers out here!

Figure 3: Despite the gangrene on his right foot, the 'Tsunami Buoy' lifeguard (and his 'little' team) kept the area 83 miles southwest of San Nicolas Island safe for area swimmers (Photo: Nicole Hedrick, adapted by Cornelia Oedekoven).

Date	CTD's	XBT's	Bongo Tows	Comments
11/10	2	3	1	
11/11	1	3	1	
11/12	1	3	1	
11/13	0	2	0	Engine problems reduced operations.
11/14	0	0	0	Weather prohibited operations.
11/15	In port – San Francisco			
11/16	In port – San Francisco			

NOAA National Centers for Coastal Ocean Science (NCCOS). 2003. A Biogeographic Assessment off North/Central California: To Support the Joint Management Plan Review for Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries: Phase I - Marine Fishes, Birds and Mammals. Prepared by NCCOS's Biogeography Team in cooperation with the National Marine Sanctuary Program. Silver Spring, MD 145 pp.

Squeakly Report (Liz Zele and Laura Morse)

Laura and I had a busy day during this bleak week as we encountered and dropped a buoy upon a lone blue whale. For approximately two and a half hours we tracked the animal and recorded calls which were similar in structure, but not identical in frequency, to known blue whale vocals (i.e. the ubiquitous Eastern Pacific A-B call). Though unable to obtain a bearing from the buoy, we continually recorded throughout the encounter for further analysis at the lab. Close to the end of the encounter, we came upon two fin whales, who decided to add some vocals of their own! We're excited to hear what Fisheries' own acoustic guru, Shannon Rankin, thinks about our potential blue whale calls!